

THE EFFECT OF GOAT MANNURE VERMICOMPOST ON QUANTITATIVE AND QUALITATIVE PROPERTIES OF CUCUMBER (*CUCUMIS SATIVUS*)

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ABSTRACT

The present experiment aims to evaluate the effect of vermicompost produce from Goat manure on growth yield and quality of cucumber (*Cucumis sativas*) vermicompost treatment at rate of 0 (control), 10, 20, 30 ton/h⁻¹ were incorporated into the top of the soil. During this experiment the fruits were harvested three times in weeks. The Stem heights, number of leaves, number of fruits were recorded for three months. The result of Stem height, number of leaves, number of fruits increased significantly ($P \leq 0.05$) as compare to control plot at 30, 60, 90 days. The plots treated with 30 ton/ha vermicompost shows quantitative increased fruit number and their weight. The fruits harvested from the plot receiving vermicompost had higher total soluble solid (TSS), lower juice acidity than the plot without vermicompost.

KEYWORDS: Earthworm, Cucumber, Vermin Compost, Fertility, Acidity

INTRODUCTION

Organic matter has a property of binding mineral particles like calcium, magnesium and potassium in the form of colloids of humus and clay, facilitating stable aggregate of soil particles for desired porosity to sustain plant growth (Tisdale and Oades, 1982). vermicomposts are finely-divided, peat-like material, with high porosity, aeration, drainage, water holding capacity and microbial activity which make them excellent as soil conditioner and as plant growth media (Edwards and Burrows, 1988; Edwards, 1998; Atiyeh et al., 2001). Several experiments have demonstrated that vermicompost contain plant- growth regulating materials such as humic acid (Senesi et al., 1992; Masciandaro et al., 1997) and plant growth hormones like auxins, gibberellins and cytokinins (Krishnamoorthy and Vajranabhiah, 1986; Tomati et al., 1990). The use of organic amendments such as traditional thermophilic composts has been used to increase crop productivity and yields (Bwamiki et al., 1998; Johnston et al., 1995; Maynard, 1993) and their use has been associated with improved soil structure, enhanced soil fertility and increased soil microbial population as well as activity and an improved moisture holding capacity of the soil (Zink and Allen, 1998; Barakan et al., 1995). Organic amendments like vermicompost promote humification, increased microbial activity and enzyme production, and increase the aggregate stability of soil particles, resulting in better aeration (Perucci, 1990). Despite the beneficial effects of compost in improving soil fertility and other soil characteristics, high metal concentrations in this material may limit its utilization. Furthermore, the application of high amount of vermicompost from composted urban wastes might cause significant reduction in the soil fungi activity, which must be taken into account when using these organic amendments in agricultural systems (Sainz et al., 1998). The application of a range of humic acids, that had been extracted from vermicomposts with all needed nutrients, increased the overall growth of tomatoes and cucumbers significantly in a very similar pattern to the effects of a range of vermicomposts (Arancon et al., 2006; Arancon et al., 2008). However plant growth hormones can become adsorbed into the complex structure of humic acids that are produced very rapidly in vermicomposts (Canellas et al., 2000) and may have acted in conjunction with them to influence plant growth, since humates have also been shown to increase plant growth. The microbes are also capable of producing auxins, cytokinins and gibberellins during vermicomposting.

(Brown, 1995; Arancon et al., 2004), which affects plant growth appreciably (Tomati et al., 1990; Arancon et al., 2004). Krishnamoorthy and Vajranabhiah (1986) demonstrated that earthworm activity could dramatically promote the production of cytokinins and auxins in organic waste. They also showed that there were strong positive correlations between earthworm populations and amount of cytokinins and auxins produced in field soils. Also they revealed that cytokinins and auxins produced by interactions between earthworms and microorganisms could persist in soil for up to 10 weeks but degraded rapidly if exposed to sunlight. Atiyeh et al. (2002) reported that plant hormones such as IAA, kinetin and gibberellins are relatively transient in soil because of their solubility and rapid breakdown in ultraviolet light. Mishra et al. (2005) demonstrated that vermicompost had beneficial effects on growth and yield of upland rice and significantly increased seed germination, chlorophyll concentration and yield. Arancon et al. (2004) reported positive effects of vermicompost on growth and yield of strawberry; especially increases in leaf area, shoot dry weight and fruit weight under field conditions. We previously reported the effect of vermicompost on the increased growth and yield of tomato as a result of an improvement in soil physical properties, soil fertility and uptake of mineral nutrient (Azarmi et al., 2008). The effect of sheep manure vermicompost on quantitative and qualitative properties of cucumber grown in greenhouse (Azarmi et al., 2009). The organic farming improves fertility of soil and to avoid bioaccumulation. The cucumber yield was selected for this experiment because of it is a cash crop of Nashik district and used as salad in many restaurants. The main aims of this study were to assess the effect of vermicompost on growth, qualitative and quantitative factors of cucumber plant.

MATERIALS AND METHODS

The experiment was conducted at Niphad tahsil of Nashik district during 2011. For preparation of vermicompost earthworm (*Eisenia foetida*) were incorporated in the goat manure under control condition in vermicompost farm. In this experiment four plots were selected for the treatment. The cucumber variety (N-46) and plots measured about 5×4m in size. First plot considered as control (No addition of vermicompost). Second plot added with 10 ton/ha vermicompost, third 20 ton/ha and fourth 30 ton/ha vermicompost simultaneously. After 30, 60, 90 days parameters like plant height, number of leaves, number of fruits, etc. were recorded and average result calculated before and after treatment of vermicompost. At the end of the experiment treated plants and fruits were harvested of each treatment. The plant height, number of leaves, number of fruits in each week for three months data was collected. The pH and EC were measured by pH meter and EC meter. The data obtained from this experiment were subjected to analysis by applying statistical methods for different treatments.

Table 1: Effect of Goat Manure Vermicompost on Quantitative Property (Stem Height) of NS-46 (*Cucumis sativus*)

Vermicompost (Ton/Ha)	Stem Height		
	30 Days	60 Days	90 Days
0 (control)	38.93± 1.34	127.33±2.66	198.33±2.35
10 ton/ha	54.79± 1.27	137.00±2.16	207.33±1.89
20 ton/ha	56.26±1.28	148.33±3.03	215.66±2.24
30 ton/ha	67.72±0.77	151.00±2.94	226.00±3.74

Table 2: Effect of Goat Manure Vermicompost on Quantitative Property (Number of Leaves) of NS-46 (*Cucumis sativus*)

Vermicompost (Ton/Ha)	Number of Leaves		
	30 Days	60 Days	90 Days
0 (control)	19.66±1.34	27.00±2.16	41.66±2.96
10 ton/ha	25.66±1.80	28.33±2.00	43.66±2.73
20 ton/ha	38.00±2.45	36.66±3.46	45.00±2.24
30 ton/ha	44.33±3.34	39.66±4.17	47.33±3.45

Table 3: Effect of Goat Manure Vermicompost on Quantitative Property (Number of Fruits) of NS-46 (*Cucumis sativus*)

Vermicompost (Ton/Ha)	Number of Fruits		
	30 Days	60 Days	90 Days
0 (control)	27.33±1.75	31.00±0.82	31.66±1.40
10 ton/ha	36.66±1.84	36.66±1.83	39.00±0.81
20 ton/ha	39.66±1.77	37.33±1.77	42.33±2.12
30 ton/ha	40.33±1.69	42.33±2.12	38.66±2.95

Table 4: Effect of Goat Manure Vermicompost on Qualitative Properties (PH) and Total Soluble Solid) of NS-46 (*Cucumis sativus*)

Vermicompost (Ton/Ha)	PH of Juice	Total Soluble Solid (%)
0 (control)	4.2	5.62
10 ton/ha	4.4	5.90
20 ton/ha	4.0	5.42
30 ton/ha	4.3	5.22

RESULTS AND DISCUSSIONS

The present investigation, plant growth factors like plant height, number of leaves, number of fruits were significantly ($P \leq 0.05$) affected by vermicompost treatments. The vermicompost treated plot had comparatively shows strong result with control plot. The harvested fruits from treated plot had higher TSS (Total soluble solid) and lower the juice acidity with control plot thus the organic farming in presence of earthworm improves the oil structure, enhanced soil fertility and increased soil microbial population as well as water holding capacity of the soil. Soil analysis result shows quantity of micronutrients like C, N, P, K, Fe, Mn, Zn, and Cu and PH before and after experiments. It was significantly liable for fertility of soil. The vermicompost treated plots shows effectively increased plant height in response with increasing the quantity of vermicompost in different plots of cucumber yield. The plots treated with 30ton/ha vermicompost increased plant height, number of leaves, and number of fruits significantly ($P \leq 0.05$) than control plot. The application of vermicompost to soil had no significant effect on cucumber juice EC shown (table no.3) the fruits harvested from plant that received vermicompost had significantly ($P \leq 0.05$), greater total soluble solid (TSS) and lower the acidity than those harvested from the control plot yield.

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